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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:

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Serial No. 10/779,819

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For: METHOD OF AND APPARATUS FOR RECORDING DATA ON A MINIMALLY
BLANKED OPTICAL DISC IN AN INCREMENTAL RECORDING MODE AND
COMPUTER READABLE STORAGE MEDIUM ENCODED WITH PROCESSING
INSTRUCTIONS FOR PERFORMING THE METHOD

**SUBMISSION OF VERIFIED ENGLISH TRANSLATION OF PRIOR FOREIGN APPLICATION
IN ACCORDANCE WITH THE REQUIREMENTS OF 37 C.F.R. § 1.55**

Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

According to 37 C.F.R. 1.55, to perfect the Applicant's foreign priority filing date, a
verified English translation of the following certified foreign priority application of the above-
identified US patent application is submitted:

Korean Patent Application No. 10-2003-0010042

Filed: February 18, 2003

A Certificate of Translation regarding the verification of the English translation is
submitted concurrently.

It is respectfully requested that the Applicant be given the benefit of the foreign filing date
as evidenced by the certified foreign priority application submitted and the verified English
translation thereof submitted herewith, in accordance with the requirements of 35 U.S.C. § 119.

Respectfully submitted,
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CERTIFICATION OF TRANSLATION

I, Eun-ah Choi, an employee of Y.P. LEE, MOCK & PARTNERS of Koryo Bldg., 1575-1 Seocho-dong, Seocho-gu, Seoul, Republic of Korea, hereby declare under penalty of perjury that I understand the Korean language and the English language; that I am fully capable of translating from Korean to English and vice versa; and that, to the best of my knowledge and belief, the statement in the English language in the attached translation of Korean Patent Application No. 10-2003-0010042 consisting of 10 pages, have the same meanings as the statements in the Korean language in the original document, a copy of which I have examined.

Signed this 23rd day of June 2008

Eunah Choi

ABSTRACT

[Abstract of the Disclosure]

Provided is a method for recording data on a Minimal Blank optical disk in an Incremental Recording mode. The method includes (a) determining whether or not the optical disk is formatted and recording data on the optical disk if it is determined that the optical disk is not formatted, (b) checking the state of the optical disk in a recording management area in which disk information is recorded, and (c) erasing data ranging from a next writable address to a predetermined block if it is determined that the optical disk is a Minimal Blank disk in which data is erased from the recording management area to a lead-in area after checking the state of the optical disk. The method is advantageous in that data can be sequentially managed.

[Representative Drawing]

FIG. 2

S P E C I F I C A T I O N

[Title of the Invention]

Method for Recording Data

[Brief Description of the Drawings]

FIG. 1 is a flow chart illustrating the operation of recording data in a conventional Incremental Recording mode.

FIG. 2 is a flow chart illustrating the operation of recording data according to the present invention.

[Detailed Description of the Invention]

[Object of the Invention]

[Technical Field of the Invention and Related Art prior to the Invention]

The present invention relates to a method for recording data on an optical disk, and more particularly, to a method for recording data on a Minimal Blank optical disk in an Incremental Recording mode.

Recording modes of a DVD-RW optical disk are divided into a Blank (Erase) mode, a Format mode and a Write mode. First, the Blank (Erase) mode is used to erase data recorded on a disk or initialize a disk. In case of a DVD-RW optical disk, the Blank (Erase) mode is largely divided into a Full Blank mode and a Minimal Blank mode. The Full Blank mode is used to erase data ranging from a recording management area (RMA) of the optical disk to the end of the optical disk. The Minimal Blank mode is used to erase data ranging from the RMA of the optical disk to a lead-in area. Second, the Format mode is not dependent on recording tools and allows Overwrite and Read/Write operations to be carried out freely. Third, the Write mode is a general operating mode used to record data on an optical disk. The Write mode is divided into a Sequential mode and a Restricted Overwrite mode. The Sequential

mode is further divided into an Incremental Recording mode and a Disc At Once (DAO)-Recording mode. The Incremental Recording mode is used to partially record data on an optical disk, and DAO write mode is used to fully record data for the purpose of writing the entire optical disk.

The Sequential Recording mode is used when data is recorded on a disk which is not formatted, whereas the Restricted Overwrite mode is used when data is recorded on an optical disk which is formatted. A disk new or fully blanked can be used in the Incremental Recording mode of the Sequential mode. Meantime, a disk which is minimally blanked cannot be used in the Incremental Recording mode but can be used in the DAO recording mode.

These data recording strategies are disclosed in U.S. Patent Number 6,483,799.

FIG. 1 is a flowchart illustrating the operation of recording data in a conventional Incremental Recording mode. It is determined whether or not an optical disk is formatted in step 100. If it is determined, in step 100, that the optical disk is not formatted, it is determined whether the optical disk is fully blanked in step 101. If it is determined, in step 101, that the optical disk is fully blanked, data can be recorded on the optical disk in step 102. However, if it is determined, in step 100, that the optical disk is formatted, or, in step 101, that the disk is not fully blanked, a recording error is displayed in step 103.

That is to say, to use the Incremental Recording mode which can partially record/store data, a Brand-New optical disk should be used or an optical disk on which data has been recorded once or more should be fully blanked by completely erasing the data therefrom. In case of a DVD-RW 4.7GB, it takes about 2 minutes to perform a Minimal Blank operation but about 1 hour to perform a Full Blank operation (based on DVD-RW at 1X). In other words, to use the Incremental Recording mode, a new optical disk should be purchased or a Full Blank operation, in the case of a recorded disc, requiring about 1 hour should be carried out. Although a DVD-RW optical disk has a significant advantage in that users can easily divide and erase borders, such time restriction inconveniences the users.

[Technical Goal of the Invention]

The present invention provides a method for recording data on a Minimal Blank optical disk, in which data ranging from an RMA to a lead-in area is erased, using an Incremental Recording mode which partially records/stores data.

[Structure and Operation of the Invention]

According to an aspect of the present invention, there is provided a method for recording data on an optical disk in an Incremental Recording mode in which data can be partially recorded, the method comprising: (a) determining whether or not the optical disk is formatted and recording data on the optical disk if it is determined that the optical disk is not formatted; (b) checking the state of the optical disk in a recording management area in which disk information is recorded; and (c) erasing data ranging from a next writable address to a predetermined block if it is determined that the optical disk is a Minimal Blank disk in which data is erased from the recording management area to a lead-in area after checking the state of the optical disk.

The step (a) may include outputting a recording error message if it is determined that the optical disk is formatted.

The step (c) includes recording data from a next address if it is determined that the optical disk is a Minimal Blank disk in which data is erased from the recording management area to a lead-out area after checking the state of the optical disk.

The present invention will now be described more fully with reference to the accompanying drawings, in which preferred embodiments of the invention are shown.

FIG. 2 is a flow chart illustrating the operation of recording data according to the present invention. The method includes the steps of determining whether or not an optical disk is formatted in step 200, displaying a recording error in step 201 if it is determined that the optical disk is formatted, recording data on the disk in step 202 if it is determined that the optical disk is not formatted, ending the data recording on the optical disk in step 203, checking the state of the optical disk at Field 0 of a recording

management area (RMA) in step 204, determining whether or not the optical disk is fully blanked in step 205, and erasing 1 ECC block from a next writable address(NWA) in step 206 if it is determined that the optical disk is not fully blanked.

The present invention will be explained in detail with reference to FIG. 2.

To use an Incremental Recording mode in which data can be partially recorded/stored, a Brand-New optical disk should be used or an optical disk on which data has been recorded once or more should be fully blanked by completely erasing the data therefrom.

Although the reasons why the Incremental Recording cannot be performed on an optical disk which is minimally blanked have not presented in the prior art, two main causes are generally acknowledged.

First, when next data is recorded on an optical disk in an Incremental Recording mode, the next data may be confused with data previously recorded in a border area during a seeking operation of a next writable address.

Second, when the next data is recorded on an optical disk in the Incremental Recording mode, a case where a recording area and a border area coincide with each other may occur.

For these two reasons, the Incremental Recording mode cannot be carried out on a Minimal Blank optical disk. A way to solve this problem is as follows.

A data recording method is programmed and stored in a memory (not shown). A controller (not shown) accesses a program of the memory to start data recording.

When Sequential Recording mode, which is used to record data on a non-formatted disk, is used, the controller determines whether or not the currently loaded optical disk is formatted in step 200.

If it is determined, in step 200, that the currently loaded optical disk is formatted, the controller displays a recording error in step 201.

If it is determined, in step 200, that the currently loaded optical disk is not formatted, data is partially recorded irrespective of whether or not the optical disk is blanked in step 202.

When data recording at a desired position is completed, the data recording on the optical disk is ended in step 203 and the state of the optical disk is checked, that is, whether or not the optical disk is blanked at RMA Field 0 in step 204. The area of a DVD optical disk is divided into three areas: a mechanical clamping area; a recording information area including a Power Calibration area used to find an appropriate recording power and a Recording Management area used to store disk information; and an information area including a lead-in area on which substantial data is recorded, a data recording area and a lead-out area. Among these areas, the information on the state of the disk, namely, the information on whether or not the optical disk is blanked is stored in Field 0 of RMA.

It is determined whether or not the optical disk is fully blanked in step 205. The information on the state of the optical disk, that is, the information on whether or not the optical disk is in Blank is stored in the Field 0 of RMA. When a value '04' is designated at the Field 0 of RMA, the optical disk becomes a Minimal Blank optical disk. After checking the Field 0 of RMA, if it is determined that the optical disk is fully blanked, data is recorded up to a wanted position.

However, if the '04' is designated at the Field 0 of RMA and thus the optical disk is determined to be in Minimal Blank, the controller erases data of 1 error correction code (ECC) block (16 sectors) from a next writable address in step 206.

The reason the data corresponding to 1 ECC block is erased from the next writable address is to prevent the data confusion and the coincidence of a recording area and a border area, as previously explained. That is to say, the reason is to smoothly perform the Incremental Recording mode even on the optical disk that is in the Minimal Blank state.

After the data of 1 ECC block is erased from the next writable address, data is recorded up to the desired position.

While the present invention has been particularly shown and described with reference to exemplary embodiments thereof, it will be understood by those of ordinary skill in the art that various changes in form and details may be made therein without

departing from the spirit and scope of the present invention as defined by the following claims.

[Effect of the Invention]

As described above, the Incremental Recording mode can be applied to a Minimal Blank optical disk, thereby providing convenience to users and enabling data to be sequentially managed.

What is claimed is:

1. A method for recording data on an optical disk in an Incremental Recording mode in which data can be partially recorded, the method comprising:

(a) determining whether or not the optical disk is formatted and recording data on the optical disk if it is determined that the optical disk is not formatted;

(b) checking the state of the optical disk in a recording management area in which disk information is recorded; and

(c) erasing data ranging from a next writable address to a predetermined block if it is determined that the optical disk is a Minimal Blank disk in which data is erased from the recording management area to a lead-in area after checking the state of the optical disk.

2. The method of claim 1, wherein the step (a) includes outputting a recording error message if it is determined that the optical disk is formatted.

3. The method of claim 1, wherein the step (c) includes recording data from a next address if it is determined that the optical disk is a Minimal Blank disk in which data is erased from the recording management area to a lead-out area after checking the state of the optical disk.

FIG. 1

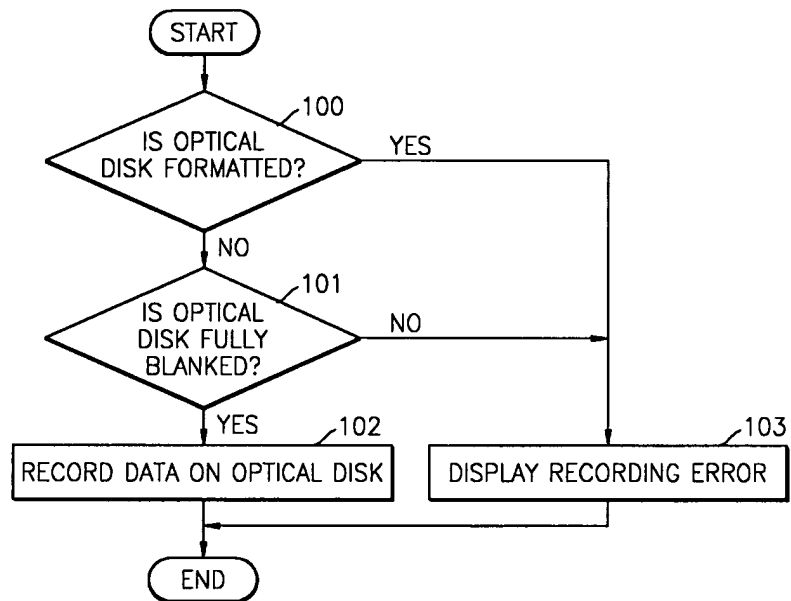


FIG. 2

